

Distribution And Inventory Of Gastropods Species In Lake Duo, Kerinci Regency, Jambi

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ABSTRACT-- Lake Duo has the potential to be used by the community as a place to find fish and tourism. Tourist activities and land changes in the lakeside area as fields are suspected to damage the environment and disrupt the life of lake organisms, namely gastropods. Therefore, the purpose of this study was to determine the distribution and species of gastropods in Duo Lake, Kerinci Regency, Jambi. This research was conducted in October 2018 using the survey method. Meanwhile, the research was conducted purposively based on differences in environmental characteristics, namely station 1 (near primary forest) and station 2 (area near community fields). Each station consists of 3 sampling sub-stations. Gastropod sampling was carried out at water depths of 0.5 m, 1 m, and 1.5 m using the Ekman Dredge. Subsequently, the gastropod samples were identified at the Ecology Laboratory, Andalas University. The results found 322 gastropods from 4 families and 6 species, namely Ampullariidae (*P. canaliculata*), Viviparidae (*F. sumantrensis*), Planorbidae (*Physastra* sp.), and Thiariidae (*M. tuberculata*, *Melanoides* sp., and *T. scabra*). *Melanoides* sp. dominant with a total of 211 individuals. *P. canaliculata* and *F. sumantrensis* were the lowest species found, each with 5 individuals.

Keywords – Gastropods, Identification, Kerinci, Lake Duo, Species.

I. INTRODUCTION

Gastropods, also known as snails or snails, are members of the phylum Mollusca. There are 30,000 gastropod species that have been identified and about 15,000 species that have become fossils [2]. It is estimated that there are 1500 species of gastropods found in Indonesia[16].

Gastropods are cosmopolitan organisms that have a wide and even distribution. Gastropods can be found in various ecosystems, one of which is freshwater ecosystems. Generally, freshwater gastropods are found in swamps, rivers, and lakes. There are 4000 species of gastropods found in freshwater ecosystems [22].

Gastropods have an important role both ecologically and economically. Ecologically, gastropods play a role in the decomposition process of dead aquatic plants and the process of recycling nutrients [4]. Gastropods are also one of the organisms that adapt to environmental conditions so that they are used as bioindicators of the quality of the aquatic environment [22]. Economically, gastropods can be used as souvenirs, jewelry, industrial materials, and foodstuffs that have high protein value [14, 10].

Lake Duo is a habitat for freshwater gastropods. This lake is located in the area of Mount Batuah, Lempur, Gunung Raya District, Kerinci Regency, Jambi Province which is located at an altitude of 1500 meters above sea level with an area of ± 12 ha and is included in the Kerinci Seblat National Park (TNKS) area. Lake Duo has neither inlet nor outlet. Lake water is sourced from water infiltration from Mount Batuah, excess air flowing through underground channels is scattered to villages in the Lekuk 50 Tumbi Lempur area [5].

The lake is surrounded by primary forest and community fields in the form of cinnamon. Duo Lake is often used as a camping area and a tourist spot that is quite crowded. Tourist activities and land changes in the lakeside area are suspected to affect the quality of the lake waters, and furthermore it is feared that it will have an impact on the life of the organisms in it, including gastropods. The presence of gastropods correlates with the conditions in which organisms live, or physical, chemical, aquatic factors such as temperature, oxygen, pH, organic matter content and sediment texture [29].

There is very little research on gastropods in lakes in Jambi Province. Found 2 families of 2 species of gastropods in Teluk Lake. Meanwhile, found as many as 5 families of 12 species of gastropods in Lake Kerinci [1, 9]. On the other hand, research on gastropods in Lake Duo has never been reported. Therefore, further studies are needed to determine the distribution and species of gastropods so that they can be used as policy references by the relevant agencies for gastropods in Lake Duo, Kerinci Regency, Jambi.

II. METHODS

This research was conducted on 13 October - 13 November 2018. The research location is in Lake Duo, Kerinci Regency, Jambi (Figure 1). This research was conducted by survey method. The research stations were determined purposively based on differences in environmental conditions in the form of riparian vegetation (Table 1). Furthermore, at the research station there are 3 sub-stations for sampling. At each sub-station, gastropod samples were taken at water depths (0.5 m, 1.0 m, and 1.5 m) using the Ekman Dredge. Sampling was carried out 3 times repetition. The substrate and gastropod samples were then separated using a Tyler stratified sieve (USA) with a mesh of 250 microns and 275 microns.



Figure 1. Research location in Lake Duo, Kerinci Regency, Jambi.

TABLE 1. GEOGRAPHICAL LOCATION OF GASTROPOD SAMPLING IN LAKE DUO

Station	Site	Description
1	S02°18'02,84" E101°33'46.09"	Near the cinnamon field area and tourist area
2	S02°18'14,71" E101°33'34.84"	Near primary forest area.

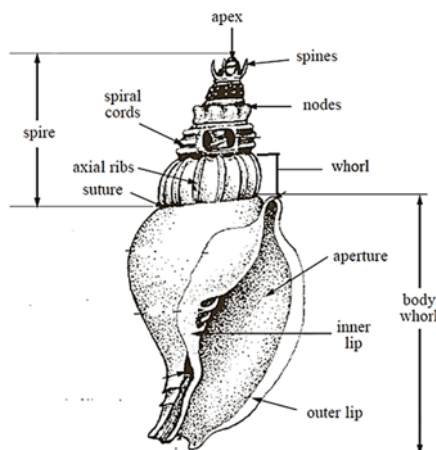


Figure 2. Gastropod shell morphology (Poutiers, 1998)

The gastropod sample was then cleaned and put into a sample bottle containing 4% formalin as a preservative and labeled with paper as sample identification. The samples were then taken to the laboratory to be measured and identified. Gastropod identification using Burch's (1989) reference book; Smith (2001); Thorp and Rogers (2019), and verified by the LIPI Cibinong Zoological Laboratory. Species identification was carried out by looking at morphological characteristics such as shape, length, shell color, apex, whorl, body whorl, spiral cord, axial ribs, suture, and aperture (Figure 2).

Once identified the sample is measured using calipers. The data obtained were analyzed descriptively by describing the morphological characteristics and compared with the literature.

III. RESULT AND DISCUSSION

A. Number and species of gastropods

Observations at 2 stations found 322 gastropods from 4 families and 6 species, namely Ampullaridae (*P. canaliculata*), Viviparidae (*F. sumantrensis*), Planorbidae (*Physastra* sp.), and Thiaridae (*M. tuberculata*, *Melanoides* sp., and *T. scabra*) (Table 2). Based on the observations, *Melanoides* sp. dominantly found in both station 1 and station 2 with a total of 211 individuals. The large number of individuals found because this species has a broad tolerance to changes in environmental conditions. The family Thiaridae is adaptive to environmental conditions so that it can be found in polluted waters [31]. Species of the *Melanoides* genus can almost be found in all water locations with muddy and sandy substrate types [23].

Station 1 has fewer species and numbers of gastropods than station 2 (Table 2). This is due to environmental factors at station 1 which are not suitable for gastropods. The lakeside area is a community field, there is little litter that enters the water body so that the organic matter which is one of the gastropod foods decreases. In addition, the activities of tourists and climbers, such as bathing and washing toilets (MCK), can cause water turbidity and reduce dissolved oxygen levels. Station 1 has a lower dissolved oxygen level of 5.64 mg/l than station 2 (6.58 mg/l). The increased reproductive activity of gastropods can be influenced by the clarity and concentration of oxygen in the water. When in murky waters, gastropod egg production will be less than when in clear waters [13].

Overall, fewer gastropod species in Lake Duo were found than those found in Lake Kerinci which were 12 species in 5 families. However, there are more gastropods in Teluk Lake, Jambi, namely 2 species in 2 families. Other studies on gastropods in the Sumatra Region include Singkarak Lake, West Sumatra found 4 species in 1 family of Gastropods. The research in Lake Diatas, West Sumatra, 9 species were found in 5 families of gastropods [9, 1, 30, 14].

TABLE 2. SPECIES AND NUMBERS OF GASTROPODS IN LAKE DUO

No	Family	Species	Station		Total
			1	2	
1	Ampullaridae	Pomacea canaliculata	1	4	5

2	Planorbidae	Physastra sp.	11	23	34
3	Thiaridae	Melanoides tuberculata	9	49	58
		Melanoides sp.	104	107	211
		Thiara scabra	1	8	9
4	Viviparidae	Filopaludina sumatrensis	-	5	5
Total			126	196	322

B. Descriptions of species gastropods

1) Famili Thiaridae

a) *Melanoides tuberculata*

M. tuberculata has a rather thin shell, conical shape, tapered apex, many spiral ribs but smooth. The body whorl is convex, the size difference between the body whorl and whorl is not clearly visible. The whorl number is 5-6, and the sutures are clearly visible. The color of the shell is light brown and dark brown at the end of the body whorl near the aperture. There is a dark brown vertical stripe pattern. The length of the shell ranges from 7.30-23.50 mm. Aperture (mouth shell) wide, has an operculum. The direction of rotation of the dextral shell (rotating to the right) (Figure 3).



Figure 3 . *M. tuberculata*

The whorl shape of *M. tuberculata* is round and elongated, the axial ribs are not clear or absent, while the spiral grooves of the ribs or transverse lines are usually well developed and quite clear [5, 28]. *M. tuberculata* has a shell rotation character to the right (dextral) and on the surface of the shell there is a flame-like pattern that is scattered randomly or regularly like axial lines [3].

b) *Melanoides* sp.

Melanoides sp. found to have a conical shell with a tapered apex, the color of the shell is slightly yellowish brown, the sutures are clearly visible and deep. Body whorl is convex, the number of whorls is 4-6. The vertical rib is clear and prominent. Elongated wide aperture, has an operculum. The direction of rotation of the dextral shell (rotating to the right). The length of the shell ranges from 5-



Figure 4. *Melanoides* sp.

20 mm. Genus *Melanoides* has a slender/slightly slender shell, with sculpture (axial and spiral ribs) protruding or clearly visible on the surface of the shell [28].

c) *Thiara scabra*

T. scabra found in Lake Duo has a shell length ranging from 9.8-10 mm consisting of 5-6 whorls, a short round shell with yellowish brown color with brown stripes. There are spines on the surface of the shell, the body whorl and sutures are clearly visible, have a tapered apex and aperture tip, and have an operculum.



Figure 5. *T. scabra*

T. scabra has a thick shell, not transparent, with the character of the shell turning to the right (dextral). The length of the shell can reach 20 mm, consisting of 6-8 whorls. The shell is pagodiform, short. The color of the shell is brownish yellow with brown vertical stripes alternating with spines [26, 11]. This species is commonly found in stagnant or flowing freshwater, with a muddy or sandy bottom substrate; up to an altitude of 1,400 meters above sea level. Some are found in brackish waters [32].

2) *Famili Planorbidae*

a) *Physastra* sp.

This species has a round oval shell with a blunt apex, yellowish brown shell color, clear and deep sutures. Whorl body slightly wide, elongated, and clearly visible with the number of whorls 2-3. The aperture is slightly elongated, does not have an operculum. The direction of rotation of the shell is sinistral (rotating to the left). The length of the shell ranges from 9-11 mm. The genus *Physastra* is included in the family Planorbidae, has a relatively small or not too wide body whorl, narrow aperture, high spire. This genus has a shell length of < 25 mm [32].



Figure 6. *Physastra* sp.

3) *Famili Viviparidae.*

a) *Filopaludina sumatrensis*

F. sumatrensis was found to have a rounded, thick shell with a smooth surface (vertical and axial ribs did not protrude). The color of the shell is yellowish or greenish yellow with a brown spiral pattern. The direction of rotation is dextral circular. Shell length 22.70 mm, width 17.50 mm. The body whorl is clearly visible, the number of whorls is 3-4. Suture is clear. Wide rounded aperture, has an operculum.



Figure 7. *Filopaludina sumatrensis*

Information about this species is still very limited. The distinguishing characters between *F. sumatrensis* and *F. javanica* were the presence of a circle line, the difference in the number of indentations and the average size of the shell. *F. javanica* generally has a medium circumference and the shell size is relatively larger than *F. sumatrensis*, but the embryonic shell size is smaller. The number of embryonic shells in *F. javanica* was more (mean 14/parent) than *F. sumatrensis* (mean 12/parent). The size of the radula in *F. javanica* was on average longer (> 3mm) than *F. sumatrensis* (< 3mm), as well as the number of rows of teeth in *F. javanica* was larger (115 rows), whereas in *F. sumatrensis* only 96 rows [15].

4) *Famili Ampullariidae*

a) *Pomacea canaliculata*

This species has a round and large shell with a slightly blunt apex, golden yellow shell color, clear and deep sutures. The wide aperture is slightly oval, has a brown operculum. The direction of rotation of the dextral shell (rotating to the right). The length of the shell ranges from 37-42 mm with a width of 32-36 mm.

P. canaliculata has a slightly thin or transparent globose (rounded) shell shape with a smooth surface with a yellowish or dark brown color. The direction of rotation is dextral circular. In the part around the suture the color of the shell becomes lighter. The suture curves to form a deep channel. The aperture is cylindrical in shape and the columellar lip is not thickened. shell length 12.58 - 69.66 mm, shell width 4.94 - 64.90 mm [16].



Figure 8. *Pomacea canaliculata*

IV. CONCLUSION

The gastropods found at the study site were 322 individuals, consisting of 4 families and 6 species, namely the Ampullaridae (*P. canaliculata*), Viviparidae (*F. sumantrensis*), Planorbidae (*Physastra* sp.), and Thiaridae (*M. tuberculata*, *Melanoides* sp.), and *T. scabra*). The most common species found were *Melanoides* sp and the least found were *P. canaliculata* and *F. sumantrensis*.

ACKNOWLEDGEMENTS

The authors would like to thank the Kerinci Seblat National Park Central Office for granting permission to research in Lake Duo, Kerinci Regency, Jambi.

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